

WE CLAIM AS OUR INVENTION:

1. A method for assessing pulmonary stress comprising the steps of:
generating a pressure controlled flow of respiratory gas, at a pressure,
associated with a subject having air waves exhibiting resistance
and compliance;
measuring said flow; and
determining a stress index value, representative of pulmonary stress of
said subject, from said pressure, said flow, said resistance and said
compliance.
2. A method as claimed in claim 1 comprising determining said stress
index value from the relationship
$$P(t) = R * \dot{V} + \frac{V^b}{C} + P(0).$$
wherein $P(t)$ is airway pressure, V is lung volume, \dot{V} is airway flow, R is
resistance, C is compliance, and $P(0)$ is a starting pressure.
3. A method as claimed in claim 1 comprising determining said stress
index value on a breath-by-breath basis.
4. A method as claimed in claim 1 comprising determining said stress
index value as an average over a plurality of breaths.
5. A breathing apparatus comprising:

a respiratory line adapted for connection to airways of a subject, said airways exhibiting a resistance and a compliance;
a regulator connected to said respiratory line for regulating a respiratory gas pressure, at a pressure, in said respiratory line;
a flow meter in fluid communication with said respiratory line for measuring a flow of said respiratory gas in said respiratory line; and
a control unit connected to said gas regulator for controlling said gas regulator, and for determining a stress index value, representative of pulmonary stress of said subject, from said pressure, said flow, said resistance and said compliance.

6. A breathing apparatus as claimed in claim 5 wherein said control unit determines said stress index value according to the relationship

$$P(t) = R * \dot{V} + \frac{\dot{V}^b}{C} + P(0).$$

wherein $P(t)$ is airway pressure, V is lung volume, \dot{V} is airway flow, R is resistance, C is compliance, and $P(0)$ is a starting pressure.

7. A breathing apparatus as claimed in claim 5 wherein said control unit determines said stress index value on a breath-by-breath basis.

8. A breathing apparatus as claimed in claim 5 wherein said control unit determines said stress index value as an average over a plurality of breaths of said subject.

9. A breathing apparatus as claimed in claim 5 wherein said control unit compares said stress index value to a predetermined interval and assesses said subject as exhibiting a minimum of pulmonary stress is within said predetermined interval, and assesses said subject as exhibiting pulmonary stress due to alveolar opening and closing if said stress index value is below said predetermined interval, and assesses said subject as exhibiting pulmonary stress due to alveolar overdistention if said stress index value is above said predetermined interval.

10. A breathing apparatus as claimed in claim 9 wherein said control unit employs an interval as said predetermined interval having a lower limit between 0.5 and 0.95 and an upper limit between 1.05 and 1.5.

11. A breathing apparatus as claimed in claim 5 comprising a display unit connected to said control unit for displaying humanly perceptible information, and an alarm unit connected to said control unit for emitting a humanly perceptible alarm, and wherein said control unit sets at least one control parameter for controlling breathing of the subject via said respiratory line, and wherein said control unit, dependent on said stress index value, takes at least one action selected from the group of actions consisting of generating an alarm via said alarm unit that pulmonary stress is present, generating a warning on said display unit that pulmonary stress is present, determining a change in said at least one control parameter and displaying said change on said display unit, determining a change of said at least one control parameter and automatically resetting said at least one control parameter according to said change, displaying

a recommendation for a recruiting maneuver on said display unit, and automatically performing a recruiting maneuver.

12. A breathing apparatus as claimed in claim 8 wherein said control unit employs a control parameter, as said at least one control parameter, selected from the group consisting of Positive and Expiratory Pressure, fraction of oxygen in the respiratory gas, and tidal volume.